

## SYSTEM AND METHOD FOR AUTOMATIC REPORT GENERATION

This application is a continuation-in-part of U.S. Patent Application 09/455,551 filed on December 6, 1999, which application is incorporated herein by reference.

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### FIELD OF THE INVENTION

This invention relates generally to automated processes for gathering and organizing data and generating a narrative report from the data and more specifically to automated processes for generating a narrative report of an event, such as a sporting event, which report is formatted based upon the best fit between an analysis of the event data and a series of pre-defined report templates.

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### BACKGROUND OF THE INVENTION

There is a great desire for sports news and information among teams, players, and fans at all competitive levels including professional, semi-professional, collegiate, high school, and amateur. The size of the audience decreases exponentially, however, as the level of competition decreases. For instance, any given professional team may have an audience of several million (via game attendance, television and radio broadcasts, and print reporting of the events), whereas at the other end of the spectrum, a typical neighborhood amateur team may have an audience of perhaps ten to forty people.

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Because of the large potential audience for professional sports events, a relatively large amount of money is available for collecting and reporting on the event. Entire

industries have grown around television reporting and print reporting of professional sports teams, and upon gathering, organizing and disseminating events data and statistics regarding the various leagues, teams, and players. Because of the large audience base, collecting and disseminating professional sports events data is a  
5 lucrative industry, when the costs of gathering and reporting the event data is spread across the audience base.

By contrast, with an audience base in the tens or perhaps at most the hundreds, the cost of collecting, analyzing and reporting on a typical amateur sports team event  
10 would be prohibitive. Few amateur sports teams fans would be willing to spend hundreds or perhaps thousands of dollars to support a system for collecting and reporting the data.

Some amateur sports organizations have attempted to rely upon a volunteer  
15 workforce to minimize the cost of collecting and reporting sports event data. Oftentimes one or more parents of an amateur sports participant, or some other interested volunteer, will offer his or her services in going to the sports event and recording the important events, such as goals or runs scored, final score and the like, and in preparing a periodical newsletter with relevant team or league information.  
20 Such a system, while relatively inexpensive, seldom provides satisfactory results. The reliability of the volunteer workforce is uncertain, inconsistent or incorrect scores and event data may be reported, and the time required for a volunteer to analyze, prepare and disseminate the data is oftentimes too onerous to justify the results.

Also, the costs associated with printing and distributing the newsletter, and the time involved, means that the reporting of amateur events is often infrequent and not timely.

5 The advent of the Internet has provided an avenue whereby a limited audience can receive timely access to information at a relatively reduced cost. One example of a volunteer-based amateur event reporting system is provided for at [www.instasports.com](http://www.instasports.com). This system provides a web site on which interested fans can access information regarding their local high school amateur athletic teams. The  
10 information available, however, is limited to the information that a volunteer workforce (i.e. parents or other interested persons) are able to provide by manually recording important data about the sports events, and then manually providing that information to the web site manager. A review of the referenced web site reveals that a significant amount of the league, team, and player information that is  
15 contemplated as being available on the web site is simply unavailable because the information has not been provided to the web site manager, or else has not been placed on the web site by the manager.

Another shortcoming to the [instasports.com](http://instasports.com) web site is that, whereas some statistical  
20 data regarding a selected game may or may not be available, nowhere does the site provide a clear written or spoken narrative of the game. For that type of information, an interested audience member must still rely upon traditional media such as local television news reporting or local print media. Obviously, however, only a very small

fraction of amateur sports events are covered by traditional media, especially in more populated metropolitan areas where television air time and print space is at a premium.

5 Therefore, a need exists in the art for a system whereby information relating to an amateur sports event (or a similar event in which a relatively small audience has an interest in the statistical analysis of the event or about highlights of the event) can be collected, analyzed, and reported back to the audience in an automated, timely manner, and at a relatively low cost (on a per capita basis). The need also exists for  
10 such a system that can provide not only statistical reporting, but that can also provide for a narrative account of the sports event written in a manner that is both informative and entertaining, such as is commonly available for professional sports events (via television and print media) with larger audiences.

15 The present invention meets the existing needs in the art, as will be explained in detail in the following detailed description of certain preferred embodiments of the invention.

#### SUMMARY OF THE INVENTION

20 In one aspect, the present invention provides an automated system for generating an article describing an event. The system includes a log comprised of recorded events, means for generating statistics from the game log, and a plurality of article templates, each template having associated with it at least one condition. The system further

includes means for comparing the at least one condition to the statistics and for identifying as candidate templates those templates for which the at least one condition is met by the statistics, means for selecting one template from amongst the candidate templates, and means for generating a finished article from the selected template and  
5 the recorded events.

In another aspect, the invention provides a method of automatically generating a descriptive report of a happening. The method includes the steps of recording events in a pre-defined format in a game log, generating game statistics from the events,  
10 comparing the game statistics to a plurality of conditions associated with a plurality of templates and selecting at least one template having conditions that are met by the game statistics. In the event more than one template has conditions that are met by the game statistics, the method further includes the steps of selecting from amongst the more than one templates, a selected template having conditions that are most  
15 desirable according to pre-determined criteria, inserting game statistics and game events into the selected template to generate the descriptive report, and publishing the descriptive report.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The above features of the present invention will be more clearly understood  
20 from consideration of the following descriptions in connection with accompanying drawings in which:

Figure 1 is an overview block diagram of an integrated system for collecting, creating, and publishing sports events reports including a preferred embodiment report generator;

Figure 2 is a block diagram of a preferred embodiment report generator;

5 Figure 3a illustrates the format of a preferred embodiment game event log;

Figure 3b illustrates the format of a preferred embodiment game event;

Figure 4 illustrates an exemplary template used for article generation in a preferred embodiment; and

10 Figure 5 is a flowchart of a preferred embodiment process for generating a narrative description of an event.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

15 The making and use of the various embodiments are discussed below in detail. However, it should be appreciated that the present invention provides many applicable inventive concepts which can be embodied in a wide variety of specific contexts. The specific embodiments discussed are merely illustrative of specific ways to make and use the invention, and do not limit the scope of the invention.

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### Description of Integrated System

Referring now to Figure 1, an integrated system employing a preferred embodiment of the present invention is described in block diagram format. Integrated sporting event



and disseminated to e.g., participants 1, such as players seeking information on their team schedule. Likewise, participants 1 will use web interface 12 to enter their own relevant information such as registration information, which can then be accessed and used by ASO 2 in forming the leagues and teams.

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Also illustrated in Figure 1 is the interchange of information between integrated system 10 and news publisher 7 and sports journalist 5. As will become clear in the following detailed description, the integrated system 10 provides for an efficient and inexpensive solution to providing timely and complete information regarding sporting events to any interested audience. Further details regarding report generator are provided in the following paragraphs.

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### **Automatic Article Generator**

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Report generator 18 preferably generates entertaining and informative narratives of games played. While the preferred embodiment is described in the context of amateur sports events reporting, it should be apparent that the teachings provided herein apply in other contexts in which it is desired to generate narrative reports, summaries, articles, and the like from a collection of fairly uniform instances of events.

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The information regarding key game events is recorded by a scorekeeper 3 using an event recorder 16 which delivers that game event information to the database manager 14 where it is stored in database 58, as discussed in detail below. Report generator 18



takes the stored game event information and automatically generates reports and articles for use by AS0 2, by participant(s) 1, including players, coaches, and fans, and by local media such as newspapers, radio stations, and television stations 7.

5 As illustrated in Figure 2, game event information provided by event recorder 11 is stored in database 58 in the form of game logs 66, as indicated by "game log 1," "game log 2," "game log n." Figure 3a provides additional details of a game log 66. Each game log 66 is comprised of a listing of game events 102 (each such game event corresponding to a game event as recorded in event recorder 16 by scorekeeper 3).

10 As illustrated in Figure 3b, each game event 102 comprises a game identifier field 104, indicating for which game the event was recorded, and one or more fields 106a, 106b, etc., providing information regarding the event. The game identifier 104 is a unique identification code given to each game for which a game log 66 is stored in database 58.

15 Fields, 106a, 106b, etc. provide information about the individual game event 102 that will be used in generating the game report. In the preferred embodiment, each game event has four fields associated with it in addition to the game identifier 104. The first field describes the type of event. As an example, for "event type" field 106a, an event may be of the type scoring event. The information contained within  
20 field 106a of game event 102 will indicate that the particular game event recorded by the scorekeeper was a scoring event (such as a home run in baseball, a touchdown in football, a goal in soccer, or some similar scoring event). Other "event types" could include fouls, penalties, assists, substitutions, and the like.



searched for event type "time-out" (field 106a) and the point values (field 106c) associated with each time-out added up. Because the point value is one, the sum of the fields 106c will equal the total number of time-outs in the game.

5 Yet another field of game event 102 is time stamp 106d. This fields contains information relating to the time, relative to the start of the game, that the particular event occurred. While the preferred embodiment fields are described above for illustration, it will be clear that other fields are contemplated within the scope of the invention. Additional examples might include an event sub-type field which would allow  
10 for distinguishing different categories of events (e.g. a one minute time-out and a twenty second time-out), or a target-pair field that would be applicable when an event involves two players (e.g. a penalty that is committed by one player against another player). Another example would be the incorporation of a second scorekeeper identification field, linked to the first game identification field 104. This would be useful,  
15 for instance, when two scorekeepers 3 (Figure 1) record information about the same game, and it is desirable to link the two game logs 66 generated by the two scorekeepers. Other fields will become apparent through routine experimentation.

The game events 102 comprising the game log 66 provide the information from which a complete and descriptive report or article can be generated. In many instances, the  
20 article will be even further enhanced by incorporating historical context information (league standings, wins-losses record, and the like). Such historical context can be provided by generating statistics from past game logs. Preferably, historical context can be quickly derived from stored game summaries which store a few particularly

relevant data points about past games, as will be described more fully below. The article is generated by selecting one article template from a series of templates and inserting game-specific information, generated from the game log, into that template. Further description of the article templates 68 will be provided in the following paragraphs.

Figure 4 illustrates an exemplary article template 68. A template is a pre-written description of a game. Perhaps more accurately, a template is a pre-written description of a model game with fields in which references to an actual game can be input. For instance, a very simple template might state simply that "[WinningTeam] beat [LosingTeam] last [GameDay], with a final score of [WinningScore] to [LosingScore]." Obviously, this very simplistic template is provided solely for explanation and an actual template will provide much more detailed information and will present the information in an informative and entertaining manner. The simple example provided, however, illustrates how the template is essentially generic, but provides fields wherein game-specific information (such as the names of the teams, and the final scores) can be inserted in order to generate an article that describes the actual game. Information for the fields is generated by the use of tokens, as will be discussed in greater detail below.

As shown in Figure 2, several different templates 68 are available. Each template describes a different "type" of model game (e.g. a tie game, a "blow-out," a "slugfest," an overtime game, etc.) which can be modified to describe a specific game. Template

selector 72 must be able to quickly select one template 68 that accurately describes the game for which a report is desired. Obviously, the templates are sport specific, i.e. a template written to describe a baseball game would be a poor fit for a football game. So, each template will have associated with it the type of game to which it applies, and  
5 template selector will only review those templates that match the type of game under consideration.

With reference to Figure 4, exemplary template 68 is logically divided into a series of fields. Conditions field 108 contains several conditions which must be met in order for  
10 the template to be eligible for report generation. Further details of the conditions and selection process will be provided below. Title field 110 is a text field in which the title or headline for the article is provided, and by-line field 112 is a text field in which the name of the author of the template is provided. Text field 114 contains the text of the article to be generated from template 68. This text field will contain token identifiers  
15 throughout the text, indicating those locations for which actual game-specific information (team names, player names, scores, and the like) is to be substituted.

In the following paragraphs, the process of generating a game article will be described with reference to Figure 5. The process is initiated when an end-user requests a game  
20 article, as indicated by flowchart step 120. The end-user could be a participant 1, such as a player, coach or fan, requesting an article via web interface 12, as illustrated in Figure 2. Alternatively, the end-user might be a news publisher, such as a local newspaper requesting an article via article publisher interface 20. The end-user must



like). Also included on the Web page could be automatically generated information about upcoming games, schedules, league standings, and the like, relevant to the end-user's interests.

5 Referring again to Figure 5, once the end-user has identified a particular game in step 120, the game log 66 associated with the desired game is retrieved from database 58, as indicated by step 122. Using the information contained within game events 102, statistics generator 76 will generate a series of generic or default game statistics, per step 124. These generic game statistics are a sub-set of the entire set of game  
10 statistics that can be generated by statistic generator 76 and comprise common types of statistics that would apply to most games. Examples of generic game statistics include final score, final score differential, points per game, penalties per game, and the like. Preferably, the generic game statistics that are generated are dependent upon the type of game (soccer, hockey, etc.) under consideration. The advantageous  
15 feature of the generic game statistics are that they can be generated quickly and without consuming excessive processing bandwidth. Preferably, the generic game statistics can be generated from the game log itself, without the need to reference historical game summaries.

20 A brief explanation of the use of tokens will now be provided prior to the following detailed description of the template selection process. A token is essentially a function call from which desired information can be derived. The token can also be thought of as a variable. For instance, the conditions described above can be expressed as

tokens. Likewise, as will be described in more detail below, the variables contained within the text body of the template can also be expressed as tokens. An exemplary game condition might be that the winning team outscored the losing team by a landslide, such as a ten point difference in a baseball game. This condition can be expressed logically as "The winning team score minus the losing team score is equal to or greater than ten points". The condition can be expressed more succinctly using tokens, to wit:

$$[\text{SwTeamPoints}(\text{WinTeam})] - [\text{SwTeamPoints}(\text{LoseTeam})] \geq 10$$

Two tokens are used to express the condition. The first token, using a convention that tokens are identified with a prefix of "Sw" is SwTeamPoints, along with the argument (WinTeam). This token is a function call to statistics generator 76, which will return the final score for the winning team. Likewise, token SwTeamPoints, along with the argument (LoseTeam) will generate a function call to statistics generator 76, which will return the final score for the losing team. A simple calculation is then made to determine if the difference between the two final scores is equal to or greater than 10. As will be shown below, tokens are also employed in the templates themselves as variable fields into which are inserted the appropriate value, text string (such as a team name) or function call result.

Alternatively, the above condition could be expressed using a single token, along the lines of:

$$[\text{SwScoreDiff}] \geq 10$$



This single token would cause a function call from which statistics generator 76 will return the difference between the winning team's and the losing team's final scores.

After the generic game statistics are generated in step 124, the first article template 68 is retrieved from database 58, as indicated by process step 126. Each template has associated with it one or more conditions, which are criteria that must be met by the game statistics in order for there to be a "match" between the game under consideration and the template. In step 128, these conditions are compared to the generic game statistics that were generated in step 124 to determine if the conditions are met by the game statistics, as will be described in more detail below. For each condition, the comparison will result in either a "yes" indication that the condition is met, a "no" indication that the condition is not met, or a "TBD" indication that additional information about the game is required to determine whether the condition is met.

In decision step 130, it is determined whether any of the template's conditions are not met by the game statistics, i.e. whether step 128 resulted in a "no" indication for any of the template's conditions. If so, then the template is disregarded as not being a good fit for the game under consideration, as shown in step 132. If the comparison step 128 resulted in all conditions being "yes" or being "TBD," then the template is considered a candidate template and will be flagged as a candidate template, per step 133. This candidate template may or may not be selected for the article, depending upon whether some other template provides a better description of the game, as described in the following process steps. In step 134, it is determined whether database 58

contains additional templates for consideration. If so, processing returns to step 126 where the next template is loaded. If not, processing continues as will be discussed below. Recognize that process steps 124 through 134 allow for a quick first pass culling of all available templates. Many (in some instances most) of the available  
5 templates can be quickly eliminated by comparing their conditions to the quickly generated default statistics. For a system in which tens, scores, or perhaps hundreds of templates are contemplated, this quick first pass culling allows system 10 to quickly provide an end-user with an article without a substantial delay that could tend to lessen the desirability of the system, from the end-user's perspective.

10 Once all of the templates have been compared in this first pass (steps 124 through 134), processing proceeds to step 136, where the remaining templates that were not eliminated are re-evaluated in a second pass. Once again, each template is considered in turn. In step 138, it is determined whether the comparison step 128  
15 resulted in any of the conditions being flagged as TBD (recall this means that statistics generator 76 had not generated sufficient information to determine whether the condition was met). If any of the conditions for the template are TBD, processing continues to step 140 where the tokens associated with the TBD conditions are passed to statistics generator 76 in order to generate the information necessary to evaluate the  
20 condition. Once the additional statistics are generated, a comparison with the TBD conditions are made, step 142, and the template once again evaluated to determine if any of the conditions are not met, step 144. At this point, all the conditions should have either a "yes" or a "no" indication, all the TBD indications having been resolved in

steps 140 and 142. If the template has any "no" indications (meaning the template does not accurately match the game information), this template is disregarded as indicated in step 146, and processing proceeds to step 148. If, in decision step 138, none of the conditions are "no," indicating that the template accurately describes  
5 game, the template is maintained as a candidate, and processing proceeds to step 148. In step 148, it is determined whether there are other candidate templates for evaluation. If so, each one is loaded and evaluated in turn, in steps 136 through 148.

Note that additional statistics, beyond the generic game statistics generated in step  
10 124, are required for the second pass comparison. Some of these statistics require historical context in order to evaluate them. An example might be a template that describes a game in which the playing teams were in first and second place in their league. Obviously, that information can not be garnered from the game events log itself. The historical standing of both teams for the season is necessary in order to  
15 determine whether the game involved the first and second place teams. This information could be gathered by searching database 58 for all game logs 66 in which a team had played, adding the total points scored by the team per game, adding the points scored by the opponents in each game, determining the winner for each game, determining the total number of games the team had won, and then comparing the  
20 total wins to the total wins for every other team in that league. Then, the process would be repeated for the other team that had played in the game under consideration. Clearly, this process would be very time and processing intensive.

Game summaries greatly simplify generation of statistics that require historical context. Game summaries can be thought of as a special class of game log, in which only key information is stored, such as the identify of the teams that played, the identity of the winning team, and the winning team and losing team final scores. These game summaries can be quickly scanned to determine historical context such as league standings, league records, and the like. In other preferred embodiments, historical context can also be provided via team summaries (i.e. a special class of game log that provides the number of team wins, final scores, and the like), and via player summaries (i.e. a special class of game log that provides historical data such as number of points scored, number of games played, assists, penalties, and the like for individual players). As will be apparent to one skilled in the art, the use of historical context summaries allows for quicker processing of a greater variety of conditions, thus allowing for more detailed and fully descriptive templates to be quickly evaluated for selection.

Once all the candidate templates have been evaluated in the second pass, a short list of templates remains. Any one of these templates could accurately describe the game because all of its associated conditions are satisfied by the game statistics and information. In step 150 of Figure 5, one of the remaining templates is selected based upon a weighting criteria, as will be discussed in further detail below, and the article is used to generate a game-specific narrative of the game, as indicated by process step 152.

Further detail regarding the various steps outlined above will be provided in the following paragraphs, with reference to an exemplary game template and desired game. Assume an end-user desires a report about a recently played basketball game played between the Panthers and the Vikings. The score was close for most of the game, but the winning team pulled away decisively in the fourth quarter to prevail 100 to 80. An article that merely identified the teams and provided the final score would be accurate, but it would not give a complete description of the game and would likely not be satisfactory to the end-user. However, as described herein, a template that generically (but entertainingly) described just such a game can easily be modified to provide an accurate description that appears to the end-user to have been generated just for the game under consideration.

With reference to Figure 5, once the end-user has identified the desired game (step 120) and the game log has been retrieved from database 58 (step 122), certain generic statistics, such as identifying the winning team and the losing team and the final score are generated by statistics generator 76 in step 124. Many templates can be compared to this set of basic statistics and eliminated in the first pass. For instance, templates that describe a tie game can be quickly eliminated. Such a template will have associated with it a condition defined by tokens such as  $[SwTeamPoints(Team1)] = [SwTeamPoints(Team2)]$ . The appropriate values generated in statistics generator 76 (i.e.  $TeamPoints(Team1) = 100$  and  $TeamPoints(Team2) = 80$ ) are then compared to the condition in step 128, resulting in a "no" indication that this condition is not met (i.e. 100 does not equal 80). Hence this



[SwPlayerPoints(WinTeam,Best,Q4)] of those coming in the final period to put the game away.

[SwPlayerName(LoseTeam,Best)] had  
[SwPlayerPoints(LoseTeam,Best)] to keep his team close in the losing  
5 effort.

Obviously, much more information than simply the winning team, the losing team, and the final score must be determined in order to ascertain whether the above description matches the game. The conditions required for this template are as follows. Condition

10 1: the winning team must score double the losing team's points in the 4<sup>th</sup> quarter, expressed using tokens as [SwTeamPoints(LoseTeam,Q4)] \* 2 < = [SwTeamPoints(WinTeam,Q4)]. Condition 2: the lead scorer on the winning team must not have the highest point total for the team in the fourth quarter, expressed as [SwPlayerPoints(WinTeam,Best,Q4)] != [SwMostPointsForPeriod(WinTeam,Best)].

15 Condition 3: the winning team wins by fifteen points or greater, expressed as [SwScoreDiff] > 15. Condition 4: one winning team player must score more than 10 points in the final quarter, expressed as [SwMostPointsForPeriod(WinTeam,Q4)] > 10.

Condition 5: the overall lead scorer must play on the winning team, expressed as [SwPlayerPoints(WinTeam,Best)] == [SwPlayerPoints(EitherTeam,Best)]. Note that a

20 token can call for a text string (e.g. a team name such as [SwTeamName(WinTeam)]), can call for a statistic (e.g. the final score difference such as [SwScoreDiff]), , and can also call out for one of the above values with limiting arguments (e.g. the highest points scored in a given period by a player on a given team, such as

[SwPlayerPoints(WinTeam,Best,Q4))]. The use of tokens allows for great flexibility in writing a single template that can be readily adapted to incorporate as much detail about the actual game as possible.

- 5 Note also that some of the conditions for the exemplary template are quite specific (e.g. that one player on the winning team must score more than ten points in the final quarter). Such specificity in the conditions allows for templates that provide a great deal of game detail and provide the illusion that the article was written specifically for the game itself. On the other hand, it would be wasteful for statistics generator 76 to
- 10 generate every possible statistic that every available template might rely upon each time an article is generated. This would require excessive processing power and would cause delay in system response. By generating only a narrow set of default or generic statistics for a first pass review, system response time can be greatly improved. Once a sub-set of candidate templates is identified (via steps 124 through
- 15 134 of Figure 5), then the additional detailed statistics required for a second pass evaluation can be generated only for those statistics needed for the remaining templates. This second pass evaluation will now be described with reference to steps 136 through 148 of Figure 5.
- 20 At step 136, the above described exemplary template would likely have a "yes" indication for Condition 3, i.e. that the final score difference was fifteen points or greater – as this statistic is one of the default statistics generated in step 124. The remaining conditions, however, require information not necessarily generated in step





many satisfied conditions would be preferable to a template that has just a few satisfied conditions. Each template would describe the game accurately, but the template with the most conditions will describe the game in the most detail, and hence in the most satisfactory manner. Hence, the candidate template having the most  
5 conditions will be selected for generating a final article.

In an alternative embodiment, rather than simply adding up the number of conditions for each template, each condition could be given a weighting value. Some conditions might correspond to relatively unique game events or circumstances that are  
10 particularly newsworthy, even if other templates have more conditions. Take for instance, a template that has only three conditions – but one of those conditions is that the winning team just broke the league record for consecutive wins or entered into the play-offs because of the win (note that this condition requires reference to historical context, such as is provided by game summaries). This fact is particularly newsworthy  
15 and an article generated from that template would likely be more desirable to the end-user than an article generated from a template having five or so conditions, but which fails to mention the truly significant fact about the game. By the use of a weighting value associated with each condition, a template having a fewer number of highly relevant conditions will be selected over a template having a greater number of less  
20 newsworthy conditions.

Other weighting criteria could be applied to selection process 150 as well. For instance, web interface 12 preferably provides a mechanism whereby an end-user can

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offer feedback concerning whether an article was helpful, entertaining, informative and the like. Such feedback can easily be converted to a numeric ranking and template selector 72 can maintain a running tally of each template's "score" as indicated by the end-users. This feed back score can be used to select from among one or more  
5 templates having the same number of conditions, or can be used as an additional weighting factor when choosing from amongst several candidate templates. In yet another embodiment, an additional weighting factor relating to how recently each template was used to generate an article is employed. In order to ensure that the same template is not selected each time an end-user requests a game article, a last-  
10 used weighting factor is employed to more heavily weight (i.e. favor) those candidate templates which have been least recently used. This will essentially allow the system to cycle through several of the same candidate templates that frequently match similar type games. In yet another embodiment, web interface 12 might provide the end-user the option to over-ride the default selection and weighting factors, and interpose his or  
15 her own criteria and weighting factors to the selection process. As one specific example, the end-user may be presented with the option of specifying that a candidate template written by a particular author (i.e. having an specific by-line) be selected over all others.

20 The above description has illustrated how a template is selected for report generation in response to an end-user selecting a game for which he or she desires a report or article. The selection is based on eliminating reports having conditions that do not match with the game statistics and selecting from amongst the matching reports that

report that has the most or the most relevant conditions. The preferred embodiments allow for a rapid selection of the best template without needlessly consuming processing cycles or generating unnecessary statistics for templates that will ultimately not be used. A further refinement in the template evaluation and selection process is now described with reference to Figure 2 and scorekeeper rater 74.

As described above, an advantageous feature of the preferred embodiments is the ability to quickly and efficiently eliminate templates that will not match the game to be described. The first pass comparison discussed with reference to steps 124 through 134 of Figure 5 supports this feature. Further support is provided by recognizing that the quality and quantity of the game events data (i.e. the game log 66) from which game statistics are to be generated is dependent upon the proficiency of the scorekeeper 3 (Figure 1). As discussed in greater detail in co-pending patent application 09/455,551, the scorekeeper 3 inputs each game event as it occurs in real time and the game events are subsequently uploaded to database 58 as game log 66 for that game. Recognize that most scorekeepers will be able to track and record basic game events such as scoring events, but that less experienced and proficient scorekeepers might not be able to track and record other game events such as assists, missed shots, and the like. In a preferred embodiment, scorekeeper rater 74 is used to assign a proficiency rating for each scorekeeper 3 who enters game events into the system 10. This proficiency rating can be based upon several approaches. The simplest approach would be to provide an increased proficiency rating as the scorekeeper becomes more experienced (i.e. provides additional game logs). A

preferable approach is a feedback mechanism based upon the number and quality of game events that are recorded for the games recorded by the scorekeeper. Alternatively, scorekeeper rater 74 could perform a simple pattern recognition algorithm in which the complexity of the templates selected is matched to the scorekeeper. A scorekeeper whose game logs are consistently matched with only the simplest template with a few conditions would have a low proficiency rating, whereas a scorekeeper whose game logs consistently match with templates that have a great number of conditions (indicating the game log provides good, detailed information) would have a higher proficiency rating.

Once a game log is selected as described above, scorekeeper rater 74 will read the identity of the scorekeeper who recorded the game log and will forward to template selector 72 a proficiency rating associated with that scorekeeper. Depending upon the proficiency rating, template selector 72 might eliminate several templates from consideration, prior to condition comparison step 128. For instance, each template might have associated with it (either as a condition, or as a separate field) a proficiency rating requirement. Assuming the scorekeeper who recorded the game under consideration has a proficiency rating of "B." Template selector 72 need only load and evaluate those templates that have associated with them a proficiency rating requirement of "B" or lesser. Other, more complex templates with a proficiency rating requirement of "A" need not be considered because historically, such templates require much greater detail than a "B" rated scorekeeper provides. In yet another refinement to the approach, scorekeeper rater 74 will receive feedback from template selector 72

indicating the proficiency rating of the selected template. When a given scorekeeper consistently has "B" rated templates selected, template selector may upgrade the scorekeeper's rating to "A" for the next few articles. This means that more articles must be evaluated each time, but also means that a more informative and detailed article will be selected if the scorekeeper's proficiency has progressed to the point where sufficient information is being entered in the game log. If after increasing the scorekeeper's proficiency rating to "A," template selector 72 still consistently selects "B" rated templates for that scorekeeper, than scorekeeper rater 74 will eventually downgrade the scorekeeper's efficiency rating back to "B." In this way, a balance is struck between the desire to provide the most detailed and hence entertaining templates to the end-user with the need to minimize response time and processor bandwidth in selecting the template.

Returning attention once more to Figure 5, once an template is selected, a final article for presentation to the end-user is generated, step 152. The article is generated from the title field 110, the by-line field 112, and the text field 114 (Figure 4). Each of these fields will be reviewed, in turn to determine whether any tokens are contained therein requiring insertion of a text string. When a token is encountered, the token will call out the appropriate routine or function, complete with any arguments associated with the function, to statistics generator 76, which returns the requested information. Preferably, the information is returned in the form of a text string, even though the string might represent a numerical value such as final score, a point value, or the like. The strings are inserted into the appropriate locations and the tokens are removed

from the text, leaving a complete article in which game-specific information is inserted seamlessly. Taking the example provided above, information stored in game log 66 or generated by statistics generator 76 will be inserted in place of the tokens, resulting in an article as follows:

5 PANTHERS PULL AWAY IN FOURTH QUARTER TO TROUNCE Blue Devils

by Dave Schmid

Plano – The Plano Panthers Basketball Team erupted in the fourth quarter for 30 points as the Panthers ended up winning big over the Central High Blue Devils Basketball Team 100 to 80.

10 Ron Toupal led the 4<sup>th</sup> quarter offensive explosion with 12 points as a close contest turned ugly thanks to Panther shooting.

David Schmid led all scorers with 16 points, 8 of those coming in the final period to put the game away.

15 As illustrated, the final article provides detailed information about the game, the teams, even individual players in an informative and entertaining manner. This example illustrates the flexibility of the system and the manner in which a generic template can incorporate game specific references to make the article appear to have been written with the specific game in mind. Once generated, the article can be presented to the  
20 end-user in any well known or desired format, including as a plain or enriched text format, in a popular word processor format, such as Microsoft Word™ or WordPerfect™, or in HTML or other common world-wide-web compatible format. Also contemplated is the inclusion of hyper-links within the body of the finished article.





generated articles and stored, less recently used articles are deleted from the storage device or medium). Alternatively, certain games likely to generate a high number of requests, such as league play-off games and the like, could be stored to a storage medium and quickly retrieved when requested, whereas less popular games could be  
5 generated "on the fly" when requested.

The templates described above contain an entire article in each template. In other embodiments, the articles may be broken down into a series of templates to allow for more variety and detail in the resulting end-product. For instance, each article can be  
10 described as an outline of generic paragraphs – e.g. an introductory paragraph, a final score paragraph, a top scorer paragraph, a season standings paragraph, and the like. Each paragraph can be thought of as a miniature template, as described above, with its own set of conditions and text fields, and tokens. Once an article format or outline  
15 is selected, the above described selection process can be performed for each type of paragraph to select a best fit paragraph for the game being described. The selection process can be further simplified by recognizing that certain paragraphs templates will naturally fit together and hence, once a certain introductory paragraph is selected, many other possible paragraphs can be quickly eliminated as being inconsistent with the content, or even the tone, of the introductory paragraph. For this reason, the order  
20 in which the paragraph templates are selected is preferably configured to minimize the likelihood that inconsistent paragraphs are selected for an article. For instance, an article containing a paragraph describing a serious injury to a player would preferably not have a light-hearted introductory paragraph. As such, recognizing the selection of

the injured player paragraph first would eliminate many introductory paragraphs and hence simplify the selection process.

A brief description of the template creation process is now provided. In the preferred  
5 embodiments, the article templates are written by an author (preferably a professional sports writer or article writer or other person well-versed in the game or type of event to be described). It is desirable to make the template generation process as unobtrusive as possible so as to allow the author to focus his or her attention on the creative aspects of the article, rather than on the mechanical aspects of generating a template.

10 Preferably, the author types an article in his or her normal manner, without concern as to inserting tokens, generating conditions or the like. More preferably, the article is written using Word™ or WordPerfect™ or a similar computer word processing system. The author may wish to write an article describing an actual game, or may wish to write an article describing a specific "type" of game and using fictitious names for the team,  
15 players, and the like. Once the article is written, tokens can be substituted for the variable information such as team and player names, final scores, game date and location, and the like. This substitution is preferably accomplished automatically using a macro that is compatible with the software with which the article was written. The author highlights a word or phrase in the article, such as a team name, and the macro  
20 will insert the appropriate token (e.g., SwTeam). In the preferred embodiment, the author selects the appropriate token from a list or menu provided by the macro, although other embodiments are contemplated in which the macro has sufficient "intelligence" to suggest a macro based upon the highlighted word or phrase. After the



students performance to, e.g. university, potential employers, and the like. Other embodiment automatic report generator systems might provide for collection, organization, management and dissemination of information about, e.g., gaming activities of any sort, internet gaming activities, contests, market reports, corporate events, medical procedures, political races, and the like.

While this invention has been described with reference to illustrative embodiments, this description is not intended to be construed in a limiting sense. Various modifications and combinations of the illustrative embodiments, as well as other embodiments of the invention, will be apparent to persons skilled in the art upon reference to the description. It is therefore intended that the appended claims encompass any such modifications or embodiments.